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ABSTRACT

Educators involved in the delivery of distance education would do well to heed the following rules regarding the use of learning technologies: know yourself and how you create and manage a personal presence; aim for a mix of learning technologies and strive for integration without duplication; realize that each learning technology has its own inherent biases in how it conveys information and supports interaction; and rely on common sense when deciding when (and how much) to use learning technologies. When selecting learning technologies, educators must also consider various teaching and institutional issues, including the following: the kinds of learners that will be using the learning technologies; the relative storage and interactivity capacities of different media and their strengths and weakness in specific situations; ways learning technologies promote/block self-competence and connection; and the amount of time that can be devoted to online teaching. Learning technologies should possess the following characteristics: flexibility; engaging interface; minimum effort for maximum return; capacity for self-correction; some toleration of errors; fast feedback on another's actions; evidence of best operational capacity; ease of interaction; unobtrusive operational software; and adaption to various contexts. (The paper contains 10 references and a list of computer technology design faults.) (MN)

Keeping our balance in times of techno-turbulence

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Notes for the Colloquium in honour of Emerita Professor Helen Hugenor Lyman at the School of Information and Library Studies, State University of New York -- Buffalo, April 28, 1999.

Background

1. What follows is how I think about using any technology for learning. I've limited the amount of scholarly scaffolding in order to focus on my experiential learnings in the trenches of practice, and my synthesized knowledge of relevant literature. Besides, in these days as well as in Shakespeare's lifetime, "brevity is the soul of wit" (*Hamlet*, II,2, line 90). More detail and citations may be found in Burge & Roberts, 1998; Burge, Laroque & Boak, 1999; Daniel, 1999; Dertouzos, 1998; Jonassen, Peck & Wilson, 1999; Haughey & Anderson, 1998; Norman, 1998.

2. My *bona fides* for these notes include 20 years associated with distance education, a dissertation on how graduate students experienced learning in a computer-conferenced environment, learning from a wide network of international peers, teaching by distance, and various other activities. Using technologies has helped me see their potential, e.g., increased speed of access to larger amounts of information and greater numbers of students who can take courses without trudging to a walled campus. There are some pitfalls too, e.g., time taken to learn from mistakes and unnecessarily complicated software. So I try to keep my balance in all this techno-turbulence.

3. Learning technologies (LT) as discussed here include dialogue or conferencing technologies such as audio, video and computer conferencing and face-to-face small group work, and information delivery technologies such as print, cassettes, lectures, computer software and printed text.

These reflections are grouped into three parts: Trench lessons, Elegance, and Key teaching tasks.

Trench lessons

Two general lessons apply in any thinking: (i) distinguish between issues based on inherent features of a technology and issues based on inappropriate applications of a technology; and (ii) focus on simplicity of use and complexity of content, not the reverse.

(a) Usage factors

1. LT's tend to amplify what we do well and not so well. My relaxed voice, for example, can positively 'purr' into an audio-conferencing microphone to help create a comfortable and contributive context. A stressed or tired voice can sound flat and monotonic without my noticing it, so listeners with no other para-linguistic cues to help them figure out my 'attitude' may decide that I'm not so interested in class discussions. *Know yourself and how you create and manage a personal presence.*

2. Most software has been designed by enthusiastic technical specialists (techies). Many educators and other non-techies or "humies" (Dertouzos, 1998) think that they must adjust, regardless of design faults, to the techie's designs (often set up to maximize technical capacity); rather than the techie adjusting to the educator's designs (usually to maximize thinking capacity) (See the Appendix). There are two cultures operating, for sure; but remember that as technologies stabilize their initial designs, the humies can weigh in with their demands, which, if fulfilled, will promote marketability of the new products (Norman, 1999). *Never think that it's your fault if the software feels awkward to learn.*

3. No single technology is the answer to all our teaching needs. Current pressures to put all the course materials on the web, for example, is too simplistic an answer to very complex questions about learning style differences, the kinds and levels of learning objectives and outcomes, the learning resources best suited to those objectives, the communications infrastructure in place or needed, and limits to the money and staff skills available. It also ignores research; e.g., indicating that reading on screen text takes 25% longer than reading the equivalent on paper (Nielsen, 1997). *Go for a mix of LT's: integrate but don't duplicate.*

4. Each LT has its own inherent biases in how it conveys information and supports interaction. Print, for example, conveys well the linearity of a well-structured argument, while a video cassette conveys well the emotional or movement aspects of a situation. Well-designed radio or audio cassettes create a qualitatively different relationship between speaker and listener than does the typical video conference or TV broadcast. *Horses for courses.*

5. LT's don't necessarily save work or learning time. Computer conferencing, for example, can tie a teacher-centred teacher fast and firmly to a keyboard. Or is the problem less one of the teaching model and more one of bending to the apparent demands of the new context? Emails can become a message flood when all you wanted was a glass of water. And novices can waste much time in the learning curves for LT use. *Keep cool; common sense will take you a long way.*

(b) Teaching applications

1. Think about what kinds of learners we want to work with -- knowledge photocopiers (of the delivered information) or information architects (builders of sturdy mental frameworks?) If it is 'architects', then we're into using constructivist strategies--which call for certain teaching strategies (see next section) and learning skill development. Such strategies may call for a change in teaching role, and increased roles and responsibilities for learners. Adjustments in teaching functions from a focus on delivery to a focus on structured and productive dialogue is not a dimunition in status; rather the opposite, from my experience.

2. Think about how to build into course designs and learning activities the opportunity for library skill building, especially the new 'E-Library' licensed data bases and online search services. If you work with a specialist librarian who is trained/interested in the teaching aspects of information literacy, and knows your course design and your student needs, you are blessed. See www.mun.ca/library/ref/li/caul/research.html and www.lib.unb.ca as two Canadian examples of the 'new' library.

3. Assess both the storage and interactivity capacities of each medium. Some are better than others for interaction, others better for storage than interaction but could do both passably. It's cognitively ruinous and a waste of audio-conferencing's interactive capacity, for example, to use it for lecturing. Remember too that all learners won't have your level of hardware and software. *A hammer is an everyday tool, but it's not the tool for operating a screw.*

4. Analyses of the strengths and weaknesses of conferencing technologies have to push us to re-examine and sometimes adjust habitual models of teaching (often from information delivery to managing higher-order thinking and dialogue about that information). Such an adjustment is sometimes a bigger challenge than just learning new delivery software. *It's easier to pour old wine into new bottles than it is to make new wine.*

5. Teaching behaviours and functions can be analysed by asking two easy questions. Two intrinsic motivating drives always influence personal behaviour -- the need to act competently on our own, and the need to be connected, to belong to supportive groups (MacKeracher, 1996). So the questions are: (i) "How do I use LT's to help set up the conditions to promote self-competence and connection?"; (ii) "How might my use of LTs block those drives?" If we have to ask "How to motivate my students?", it's the wrong question; no one can motivate anyone else. Work instead on fixing the conditions that block competence and connection.

© Institutional issues

1. There is always a time delay between LT adoption by the 'eager earlies' and by the 'conservative moderates'. The former sometimes cannot understand why seasoned and time-pressed faculty aren't immediately seduced by the latest software. The latter wait until the core capacities of the technology are field-tested and then need a 'negotiated settlement'. *The experienced concert-goer often avoids the first performance.*

2. Learning to use new LT's can be both exciting and frustrating at times. Faculty workload is generally already heavy, institutional resources are shrinking, and administrators look for productivity gains. What we need therefore is 'just-in-time' and 'in-my-office' help--when and where we need it (as distinct from 'just-in-case' help). *Like democracy, it doesn't come automatically.*

3. In the increasingly multi-mode offerings of courses, faculty cannot be all-purpose course design and production machines. Institutions have to consider how course materials good enough to be seen outside the ivy walls (e.g., distance-mode course manuals) can be produced by a team of skilled folk--not just the content expert (faculty) but also editor, graphic and web designer, audio producer, etc. The Open University's academic and marketing successes since 1970 are attributed in part to such institutional infrastructures (as well as highly trained tutors, research, and efficient administrative procedures (Daniel, 1999). *Sitting out on a limb can be dangerous to your health.*

4. Murphy and his family (of Murphy's Law fame) know the worst time to visit us. We may dismiss such vexations in our own meetings, but many time-stressed learners resent being educational 'techno-guinea pigs'. Feel OK about insisting on pre-tests of equipment and being compulsive about detail. Have a back-up plan to foil Murphy and keep everyone working. *"When technology fails, remember your teachnology"* (Post, 1999).

5. It's no secret that online teaching can soak up time that you really don't have, and increase student expectations for fast responses. Set your terms, and insist that learning groups help each other. It may be painful to hear this but it's amazing how learners will learn when trusted to complete tasks under basic direction. *Being Atlas and holding up the world is tough on the mental muscles.*

Elegance, or How can LT's be like a cat?

This concept and analogy appeals to me. Elegance here refers to whatever actions are "necessary and sufficient". If you are owned by a cat, you'll know what I mean: cats behave in elegant ways.

Technology should 'feel' elegant if it or its use shows these characteristics:

1. Flexible software *(ears swivel to catch passing sounds).*
2. Engaging interface *(cute face and silky fur).*
3. Proportional, linked elements of the whole (*long legs and body curl into a neat ball).*
4. Minimum effort for maximum return *(no unnecessary paw movements).*
5. Capacity for self-correction *(lands upright after an unintended vertical descent).*
6. Some toleration of errors *(humans are 'forgiven' after an absence).*
7. Fast feedback on another's action *(hisses or purrs).*
8. Evidence of best operational capacity *(claws to climb fast; not designed to fly).*
9. Ease of interaction *(just a meaningful squeak leads to food supply).*
10. Unobtrusive operational software *(invisible smell detectors by the millions).*
11 Variety of experience *provided (human feels enchanted one minute, then a domestic slave the next).*
12. Adaption to various contexts *(likes the country cottage).*

Key teaching tasks

How might the 'information architect' approach work in practice? I don't spent class time lecturing to give learners the required information. They can usually get it in other forms that also enable repeated use, e.g., reading printed notes, chasing citations for library retrieval, or listening to an audio tape. After learners have studied this new information, they come to class prepared to work with it at higher cognitive levels, i.e., to analyse, apply, synthesize, and evaluate it, using their own tacit knowledge and real-world problems as contexts and resources. Small group activity can be planned for such thinking, but it needs monitoring and it needs the teacher to generally stay out of the way.

Academic rigour is not an issue when the concept of class activity is re-defined to include clear learning objectives, structured activities before and during interaction with peers (whether in synchronous or asynchronous time), certain teacher tasks, and defined (as far as is reasonable) learning performance indicators, especially ones that enable the learner to demonstrate academic competence to herself/himself, not just to the teacher). MacKeracher (1996) provides detailed principles and strategies applicable to any technologically-mediated context.

Behind all my planning for pre-class and in-class work, or asynchronous and synchronous activities, lies one strategic question: **"What will the learners be doing to acquire, organize, elaborate, and integrate new and old, tacit and explicit information?"**

Teaching then has to focus on the following tasks:

* Connecting learners to information resources,
* Constructing purposeful group discussions,
* Controlling effective use of time,
* Confirming new learning,
* Correcting misunderstandings,
* Challenging them to more sophisticated thinking,
* enCouraging them to persevere through the expected difficulties in organizing and applying new learning, or when they experience blocks to achievement or affiliation,
* Creating new knowledge from experiential as well as theoretical information,
* helping learners Claim their own tacit knowledge, and
* Checking formally to get evidence of new learning.

If you want a shortcut to all the above thoughts, ask this question:
"How can I realistically use a mix of LT's to enhance 'cognitive ergonomics'?"

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APPENDIX

Computer-technology design faults

Michael Dertouzos (1998, pp.254-262) has listed eight faults in the design and use of computer technologies:

1. Additive: we do what we did before, plus more to look current with technology
2. Ratchet: small additions over the years enhance performance but things get to a stage when the increased technological complexity can only be simplified by a drastic 'cure'.
3. Fake intelligence: an intended ultra-smart feature can dysfunctionally override other smart features.
4. Machine-in-charge: software routines take over despite your immediate requirements.
5. Excessive learning: equivalent to expecting a person to read a long manual on how to operate a pencil.
6. Feature overload: unnecessary goodies included when just the basics are needed.
7. Perfection: seduction by software features that focus on style rather than substance.
8. Excessive complexity: incompatible hardware and software makes communication too complicated a process.

Donald Norman says it well:
"Why does everything have to be so difficult? We spend far too many hours coaxing our technology into submission, however briefly....the causes of our frustrations: poor design. ...the deadly sins that lead to difficulty: featuritis, over-cleverness, inconsistency, cuteness, being different just to be different, arrogance, technical superiority, and failure to understand human needs, psychology and behaviour. I argue for simplicity and elegance, for the adroit use of a cohesive, coherent conceptual model, perceived affordances, constraints, and conventions".
(http://www.NNgroup.com/services/talks.html Site accessed April 14, 1999).

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